Annual Reporting of Research Units

All provisional and established McGill Centres, Research groups and Networks affiliated with the Faculty of Medicine and Health Sciences (FMHS) are required to provide an annual report to the Dean via the Committee for Oversight of Research Units (CORU).

The reporting period is May 1, 2023 – April 30, 2024.

The deadline to submit your report to the Faculty's Research Office (riac.med@mcgill.ca) is

June 3, 2024

For units that receive financial support from the Faculty, continued support is contingent upon:

1. the receipt of the reporting documents on time,
2. the alignment of the Unit's structure and workings with McGill Procedures for Research Units, and Policies on Research Entities,
3. the quality of reported activities, and
4. the availability of Faculty funds.

Your collaboration on this exercise, and your continued engagement in the Faculty's mission for research excellence, are truly appreciated.

Annual Report of Activities and Outcomes

Name of the Unit: Centre for Applied Mathematics in Bioscience and Medicine

Date of creation: Aug 2009

Name of Unit Director: Anmar Khadra

Date of nomination in the role: January 2020

As per [McGill Procedures for Research Units](#) Section 10.4, Research Units are led by a Director, who is appointed by, reports to, and is accountable to the Dean of FMHS, for a fixed term of 4 years, renewable.

Mission statement of the Unit (~2 sentences):

The mission of CAMBAM is to assume a national and international leadership role in applying mathematical and computational sciences to study various aspects of physiological, biological, and ecological systems, while fostering collaborations between quantitative and experimental life scientists. CAMBAM achieves its objectives by promoting and fostering research, teaching, and training in quantitative life sciences at all levels, from molecular genetics and single-cell and whole-organ physiology to population dynamics and broader ecological questions, across various time and spatial scales. These goals are accomplished through (i) establishing various training programs that are developed independently or in collaborations with other international and national centers, including local and international conferences, scientific workshops and summer schools that involve hands-on training and continuously evolving material that copes with recent advances made in the field; and (ii) forming industry partnerships that provide internships to CAMBAM trainees. Such training opportunities assist CAMBAM PIs to develop the expertise of their trainees by bringing them up to speed with their research project and connect them with industry. CAMBAM also provides them with funding opportunities to reward exceptional trainees.

Membership

Ensure the full list of nominative members is featured on the Unit's website. Please refer to [McGill Procedures for Research Units](#) Section 7.

Number of

> **Regular Members: 19**
>
> **Associate Members: 3**
>
> **Affiliate Members: 0**
>
> **Trainee Members: 70**

Website:

Research Units must have a website with information about their mission statement, research objectives, membership and research activities.

Please note the website is also required to feature:

- all sources of funding support (including the FMHS logo),
- the list of Members and their institutional affiliation with appropriate links,

- the activities supported by the Unit,
- all previous Annual Reports.

Website address (URL):   https://www.crm.umontreal.ca/labo/cambam/en/

Please note the page limits, where indicated.

(minimum font size of 11 pts, use lay language)

1. **Explain the significance of the Unit's mission at McGill and beyond** (1/2 page max.)

- Maintain international leadership in the emerging field of quantitative biosciences. To accomplish this, CAMBAM has been a partner with an FQRNT-funded multi-center grant headed by the *Centre de recherches mathématiques* (CRM) since 2021.
- Connect researchers and students across faculties and institutions by creating interdisciplinary research teams and a framework for scientific and social interactions. That includes bridging complementary research programs together to establish multidisciplinary teams in the quantitative and life sciences. To accomplish this, we organize workshops and retreats and invite known speakers to the seminar series organized by CAMBAM in collaborations with other centers at McGill.
- Support and prepare students and postdoctoral trainees for the expanding career opportunities in quantitative biosciences in both industry and academia. Trainee members of CAMBAM regularly get email announcements about different academic and industry-based job opportunities.
- Establish stronger connections with industry through partnerships with for-profit and not-for-profit biotechnology and pharmaceutical companies, such as Labfront (with CAMBAM member Caroline Palmer, Psychology, McGill), Cairn Scientific Imaging (with CAMBAM member Gil Bub, McGill), Blue Marble Rehab Inc (with CAMBAM member Suresh Krishna, McGill), iRhythm Technologies (with CAMBAM members Gil Bub and Leon Glass), Moderna and Curevo (with CAMBAM member Morgan Craig).

2. **Alignment with the [Faculty's Strategic Research Plan](#)** (1/2 page max.)

CAMBAM contributes to the Faculty's research mission through its members' involvement in developing mathematical methods and computational tools to understand complex medical and biological system functions - from molecular to organismal levels. CAMBAM's contribution was specifically mentioned in the 2017 McGill Faculties of Medicine and Dentistry Strategic Research Plan. Additionally, CAMBAM is currently forging strong connections with Axis 3 (Modeling and Numerical Methods) of the Digital Health Network, a newly established interdisciplinary network focused on digital health and tools. Furthermore, CAMBAM had close ties with the Initiative in Computational Medicine (MiCM). In partnership with the MiCM, CAMBAM co-organized online workshops focused on mathematical and statistical methodologies. MiCM also provided seed funding to CAMBAM members with research focused on complex systems and machine learning (e.g., Anmar Khadra and Pouya Bashivan). CAMBAM also collaborates with the Quantitative Life Sciences Program in organizing a very successful seminar series in computational medicine. These activities will continue in the near future. Finally, CAMBAM is heavily involved in the QLS program with many CAMBAM members teaching in the QLS foundation course QLSC 600 (e.g., Anmar Khadra, Erik Cook, Fred Guichard, Leon Glass, Gil Bob) and (co-)supervising many QLS PhD students (e.g., Jonas Lehnert, Louis Richez, Niklas Brake, Ryan Huang, Fritz Jalandoni).

Bioscience and health research is quickly expanding from being an exclusively data collection endeavor to one that embraces the development of new technologies and quantitative methods. For example, much of the field of genetics is now driven by statistical and computational algorithms. To meet these changing needs, our researchers actively prepare students for life in both academic research and industry with the goal of bridging the "training gap" that exists between students in bioscience and those from mathematics, physics and engineering. Importantly, CAMBAM's interdisciplinary mission directly supports McGill's Strategic Research Plan to create a "convergence of life sciences, natural sciences, and engineering".

During the next few years, CAMBAM will continue its leadership role in Quantitative Biology at McGill, within Quebec and internationally. CAMBAM has regularly organized summer schools on the applications of mathematical sciences to physiology and medicine and helped sponsor several conferences such as the Canadian Biophysical Society Annual Meeting, and workshops focused on infectious disease transmission (an urgent topic in this international health crisis of COVID-19 pandemic) and cancer. We will continue to sponsor and promote interdisciplinary seminars, workshops, events and summer schools to bring together researchers from across faculties and institutions to solve critical problems in bioscience and medicine.

3. **Highlight the top-5 accomplishments of the Unit over the past 12 months** (1 page max.).

1) The organization of a very successful CAMBAM/QLS seminar series between Sept 2023-May 2024 (see **Appendix 1** for details). The list of invited speakers sponsored by CAMBAM includes Andreas Buttenschoen (UMASS, Amherst), Stephanie Jones (Brown), Stephanie Palmer (Univeristy of Chigago), Hanspeter Herzel (Humboldt, Berlin), Sridevi Sarma (Johns Hopkins), Julia Rohrer (Leipzig), Charles S. Peskin (NYU), Steven Prescott (Toronto), Carsen Stringer (Howard Hughes Medical Institute), Jonathan Rubin (Pittsburg), Adrienne Fairhall (Washington) and Angela Yu (UCSD). Please see **Appendix 1** for details. CAMBAM member Suresh Krishna co-organized it with the QLS.

2) CAMBAM member, Anmar Khadra (co-director) organized a full day CAMBAM retreat on March 5, 2024 at the ballroom of the Thomson House (**Appendix 2**). The retreat included 3 research talks by two CAMBAM members: Fred Guichard (McGill) and Vincent Jacquemet (UdeM), and one associate member: Andre Longtin (Ottawa), as well as one career talk by Jordan Masys (co-founder, Labfront). A total of 30 shortlisted CAMBAM trainees also gave 5 min talks during the retreat. Food and drinks were also served at the retreat. The event was very successful, bringing the CAMBAM community together from four different universities: McGill, UdeM, Ottawa and Concordia.

3) CAMBAM member, Morgan Craig, organized the [CRM Distinguished Lectures in Applied Mathematics](#), in which a series of lectures were given by leading experts in computational biology with a specific focus in immunology and oncology (**see Appendix 3**). Two experts gave these series of lectures, including Ruth E. Baker (Oxford) and Alison L. Hill (Johns Hopkins). Furthermore, associate CAMBAM member, Fahima Nekka, organized the workshop *[Modélisation mathématique de l'immuno-oncologie et de la neurologie : traduction des mécanismes physiologiques et pharmacologiques en stratégies thérapeutiques](#)* (**see Appendix 4**). The workshop focused on the use of computational modeling to understand the impact of therapeutics.

4) CAMBAM co-directors, Anmar Khadra and Fred Guichard, have revamped CAMBAM membership completely (**see Appendix 5**). An updated list of members was created by contacting all previous members, requesting their confirmation to remain part of CAMBAM, and asking for their respective CVs. We similarly updated the entire list of CAMBAM trainees and confirmed their membership with the CAMBAM supervisors. Three email lists were then created for the CAMBAM board, CAMBAM members and CAMBAM trainees. These two membership and trainee lists will be updated regularly every December. Finally, after serving as a CAMBAM co-director since its inception, Fred Guichard will be stepping down on June 30, 2024. CAMBAM member Paul Francois was elected as the new co-director and will begin serving on July 1, 2024.

5) Several members of CAMBAM have participated actively and successfully in establishing the Digital Health Network (**see Appendix 6**). This newly established network was successful in obtaining funding by the *Fonds de recherche du Québec* (FRQ). Several members of CAMBAM have been directly involved in establishing this network, including Anmar Khadra, Fred Guichard, Fahima Nekka and Morgan Craig. The network have received ~$1M per year in funding from FRQ and will consist of 4 independent axes: (1) Real-world data science; (2) Modeling and numerical methods; (3) Synthesis of evidence and digital interventions; (4) Digital transformation. Axis 2 is essentially an expansion of CAMBAM into the network. CAMBAM member Morgan Craig will be co-leading this axis, while Anmar Khadra will be co-leading Axis 3.

4. **Major joint publications over the past 12 months**. Please only feature peer-reviewed publications co-authored by at least two Regular/Associate/Affiliate Members of the Unit:

Names that are underlined are regular, associate and/or affiliate members of CAMBAM:

1. X Ma, L Miraucourt, H Qiu, M Xu, <u>EP Cook</u>, A Krishnaswamy, R Sharif-Naeini and <u>A Khadra</u>. ElecFeX is a User-Friendly Toolbox for Efficient Feature Extraction from Single-Cell Electrophysiological Recordings. Cell Reports Methods, in press, 2024.

2. R Arumugam, <u>F Guichard</u> and <u>F Lutscher</u>. Early warning indicators capture catastrophic transitions driven by explicit rates of environmental change. *Ecology*, e4240, 2024.

3. JF Ndiaye, <u>F Nekka</u> and <u>M Craig</u>. Understanding the Mechanisms and Treatment of Heart Failure: Quantitative Systems Pharmacology Models with a Focus on SGLT2 Inhibitors and Sex-Specific Differences. *Pharmaceutics* 15.3, 1002, 2023.

4. TM Bury, K Diagne, D Olshan, <u>L Glass</u>, A Shrier, BB Lerman and <u>G Bub</u>. The inverse problem for cardiac arrhythmias. Chaos: An Interdisciplinary Journal of Nonlinear Science 33.12, 2023.

5. L Plazen, J Al Rahbani, <u>CM Brown</u> and <u>A Khadra</u>. Polarity and mixed-mode oscillations may underlie different patterns of cellular migration. Scientific Reports 13.1, 4223, 2023.

5. **Major joint research projects funded over the past 12 months** (including shared software, data repositories; with links, when relevant) <u>involving at least two PI members of the Unit</u>:

1. Centre de Recherches Mathématiques (http://www.crm.umontreal.ca/en/index.shtml). PIs: Anmar Khadra (CAMBAM co-director) and Fred Guichard (CAMBAM co-director).

2. Digital Health Network-FRQ. PIs: Anmar Khadra, Fred Guichard, Fahima Nekka and Morgan Craig.

3. CIHR-Project Grant. PIs: Erik Cook and Anmar Khadra.

4. NSERC/FRQNT NOVA. PIs: Morgan Craig and David McLeod

5. FRQNT (StrategIA)-CRM. PIs: Morgan Craig and David McLeod

6. NSERC/FRQNT NOVA. PIs: Pouya Bashivan and Maurice Chacron

6. **Major outreach activities** (e.g., seminar series, general public events):

1. The organization of a very successful CAMBAM/QLS seminar series between Sept 2023-May 2024 (see **Appendix 1** for details). The list of invited speakers sponsored by CAMBAM are provided above. CAMBAM and QLS will continue collaborating in 2024-2025 in organizing this seminar series. A total of 12-14 talks will be allocated for CAMBAM. CAMBAM member Suresh Krishna will continue to co-organize it with the QLS.

2. CAMBAM has held a very successful CAMBAM retreat on March 5, 2024 at the ballroom of the Thomson House. The event brought the CAMBAM community together from its major universities: McGill, UdeM, Ottawa and Concordia

3. CAMBAM member Anmar Khadra and Claire Guerrier have successfully obtained funding from *Centre de recherches mathématiques* (CRM) to organize a one week conference, entitled "Rhythms, Networks and slow-fast analysis in neural and endocrine systems" (**see Appendix 7**). We have received $16,500 from CRM and $10,000 from CAMBAM (approved by the board). A total of 20 national/international speakers and 10 local speakers will be invited (we will cover the travel and accommodation cost of out-of-town speakers) and the event will be made open for other participants, especially trainees, to attend. The event will be held during the week of June 2, 2025.

4. The CAMBAM board agreed to sponsor the Canadian Biophysical Society Annual Meeting that was eventually held in Montreal between May 21-24 (**see Appendix 8**). CAMBAM provided $3,000 in support of this event. In return, the Canadian Biophysical Society offered CAMBAM trainees discounted registration fees to present posters and talks at the conference.

7. Governance body

please refer to [McGill Procedures for Research Units](#), Section 5

Each Research Unit must have a governance body, named and adapted to its size and scope, that provides strategic direction, management guidance, and ensures accountability of the activities of the Research Unit.

The Dean of FMHS is responsible for forming, chairing and appointing members to the governance body, which shall be composed at a minimum of: the Lead Faculty Dean or delegate as Chair, Deans or delegates from each of the Faculties involved, the Director, two Regular Members of the Research Unit, and at least one member from every other membership category.

The Vice-President (Research and Innovation) or delegate will serve as a member of a Research Unit's governance body.

The governance body must meet annually at the invitation of the Lead Faculty Dean to review activities and membership, assess progress and performance, approve the annual report, the annual budget for operations, and provide guidance for any issues that may arise.

Provide a detailed list of the existing/proposed governance body.

The existing governance body of CAMBAM consists of the following:

1. Lead Faculty Dean: Sylvain Baillet (The Neuro, McGill).

2. Two co-directors: Anmar Khadra (Physiology, McGill) and Fred Guichard (Biology, McGill).

3. Four board members: Erik Cook (Physiology, McGill), Antony Humphries (Math, McGill), Suresh Krishna (Physiology, McGill), Fahima Nekka (*Pharmacie*, UdeM), Paul Francois (*Département de biochimie et médecine moléculaire*, UdeM).

4. One student representative: Niklas Brake (QLS, McGill)

Date of the Unit's last Board Meeting: December 4, 2023 (**see Appendix 9**).

8. **Major training activities** (e.g., summer schools, co-supervision of trainees, practical workshops, 1 page max):

1. CAMBAM trainees organized three independent workshops approved by the CAMBAM board in the summer of 2023 (see **Appendix 10** for the email announcements). CAMBAM offered the organizers $1,000 awards for full day workshops and $500 for half-day workshops. Here is the list of these three workshops.

I.   Title: Exploring Single Neuron Excitability with Mathematical and Computational Models.

Organizer(s): Niklas Brake and Nils Koch (McGill).

Date: June 16, 2023

Duration: One full day

II. Title: Machine Learning Applications in Computational Neuroscience and Biology.

Organizer(s): Amin Akhshi (McGill).

Date: June 28, 2023

Duration: One full day

III. Title: From Genome to Phenome: A Comprehensive Workshop on Genome-Wide Scans and Cutting-Edge Post-GWAS Techniques (1).

Organizer(s): Goodarz Koli Farhood, Sahel Jahangiri Esfahani (McGill).

Date: June 27 & 28, 2023

Duration: Two full days

2. CAMBAM member Fred Guichard organized a workshop , titled "*Avancées dans la théorie des réseaux écologiques: vers une intégrations des relations entre communautés et écosystèmes*" in Paris, France, between May 22-24, 2023 (see **Appendix 11**). The workshop focused on ecological and evolutionary dynamics in networks using mathematical tools. CAMBAM was one of the sponsors of this event.

3. CAMBAM member, Morgan Craig, organized the CRM Distinguished Lectures in Applied Mathematics, in which series of lectures were given by leading experts in computational biology with a specific focus in immunology and oncology (**see Appendix 3**).

4. Associate CAMBAM member, Fahima Nekka, organized the workshop *Modélisation mathématique de l'immuno-oncologie et de la neurologie : traduction des mécanismes physiologiques et pharmacologiques en stratégies thérapeutiques* (**see Appendix 4**).

5. CAMBAM member, Anmar Khadra organized a one full day CAMBAM retreat on March 5, 2024 at the ballroom of the Thomson House (**Appendix 2**).

6. CAMBAM provided 4 competitive graduate fellowships, each worth $10,000, in the Winter 2024. Applicants were asked to submit transcripts, one reference letter from the supervisor, as well as a 1/2-page project description to be considered for the fellowship. Applications were assessed by an independent committee.

7. CAMBAM member Anmar Khadra and Claire Guerrier will be organizing a one week conference, entitled "Rhythms, Networks and slow-fast analysis in neural and endocrine systems" in June 2025 (**see Appendix 7**).

8. CAMBAM is one of the sponsors of the Canadian Biophysical Society Annual Meeting that was held in Montreal between May 21-24, 2024 (**see Appendix 8**).

9. If applicable, **list new members** who joined the Unit in the past 12 months (indicate: Name, title, Regular/Associate/Affiliate Members, affiliation):

As indicated earlier, CAMBAM was revamped completely and updated lists of members and trainees were generated. During this process, David McLeod (UdeM) joined CAMBAM as a new member. His application to join CAMBAM was approved by the entire CAMBAM board.

10. If applicable, **list members who have left the Unit** in the past 12 months
    (indicate: Name, title, Regular/Associate/Affiliate Members, affiliation):

As indicated earlier, CAMBAM was revamped completely and updated lists of members and trainees were generated. This means that many inactive members from previous years have been excluded and are no longer part of these lists.

Financial report & forecast

Please ensure your 2024/25 forecasted budget is <u>balanced</u> or explain any possible contingencies below.

Expenses	2023/24 report	2024/25 budget
Total salaries	$0	$0
Training	$3,746.68	$31,500
Stipends	$40,000	$0
Outreach	$10,139.91	$4,294.42
Publications	$0	$0
Other (detail in #10 below)	$0	$0
Total expenses	$53,886.59	$35,294.42

Revenues	2023/24 report	2024/25 budget
Carryover	$11,589.01	-$15,236.58
FMHS	$15,000	$25,000
Other sources (detail in #11 below)	$12,061	$25,531
Total revenues	$38,650.01	$35,294.42

11. Budget justification (e.g., itemize if multiple salaries, detail other sources of funding):

Year 2023-2024:

1. Training: CAMBAM (i) sponsored the workshop: "*Avancées dans la théorie des réseaux écologiques: vers une intégrations des relations entre communautés et écosystèmes*" in Paris, France ($746.68), and (ii) organized three independent training workshops ($3,000).

3. Outreach: CAMBAM (i) sponsored the Canadian Biophysical Society meeting held in Montreal ($3,000), (ii) paid for speakers to give in-person talks at the CAMBAM/QLS seminar series ($4,991.44), and (iii) organized a retreat at the Thomson House ($2,148.47).

Year 2024-2025: We will, unfortunately, not have enough funding to provide fellowships.
1. Training: CAMBAM will organize (i) a one week conference, entitled "Rhythms, Networks and slow-fast analysis in neural and endocrine systems" ($26,500), and (ii) 5 independent workshops run by CAMBAM trainees ($5000).
2. Outreach: CAMBAM will pay for speakers to give in-person talks at the CAMBAM/QLS seminar series that will be held in the Fall 2024 and Winter 2025 terms ($4,294.42).

12. Explain why continued support from the FMHS is crucial to Unit (½ page max):

FMHS support has enabled CAMBAM to pursue and achieve many of its current programs. Recognizing the fundamental importance of interdisciplinary research, CAMBAM has taken a leadership role in promoting collaborations across faculties and disciplines. It has established a track record of successful partnerships, both Canadian (e.g., Digital Health Network, NSERC-CREATE in Complex Dynamics) and international (e.g., MBI, NIMBioS, and MIT). With FMHS funding, CAMBAM has achieved its key objectives and maintained a high level of activity locally and internationally, comparable to other McGill research centers. Continued FMHS support will further promote our interdisciplinary efforts in quantitative bioscience at McGill and sustain our international presence and collaborations. Specifically, this support will help us secure the financial resources needed to organize the conference "Rhythms, Networks, and Slow-Fast Analysis in Neural and Endocrine Systems" in June 2025 and to invite speakers to our successful seminar series. FMHS

support for CAMBAM has remained stagnant at $15,000 per year for the past few years. We sincerely hope that our funding for this year could be increased to $25,000 so that we can use this extra funding to support such events.

13. Provide suggestions about how the Faculty could do better to support the Unit (**no page limit but please be specific and unleash your creativity!**)

Currently, CAMBAM operates without dedicated administrative support, relying solely on the efforts of its co-directors to manage all operations. While the CRM occasionally provides limited assistance, CAMBAM intentionally avoids spending any of its $15,000 annual funding from FMHS on administrative costs to maximize support for its core activities. Increasing our funding to $25,000 would greatly enhance CAMBAM's ability to expand its programs and organize the planned conference for 2025. Additionally, with extra funding, the number of workshops and symposia organized by CAMBAM could increase significantly, further advancing our mission and impact.

(https://www.mcgill.ca)

Quantitative Life Sciences (/qls/)

McGill.CA (https://www.mcgill.ca) / QUANTITATIVE LIFE SCIENCES (HTTPS://WWW.MCGILL.CA/QLS) / Seminar Series (/qls/seminars)

QLS Seminar Series Fall 2023

QLS has joined efforts with the Centre for Applied Mathematics in Bioscience and Medicine (CAMBAM) to offer weekly interdisciplinary seminars.

Seminars are held on Tuesdays from 12-1pm EST.

Zoom Link: https://mcgill.zoom.us/j/86855481591 (https://mcgill.zoom.us/j/86855481591)

For recordings of the seminars please visit the QLS YouTube Page (https://www.youtube.com/channel/UCShV4ohDhQDLfcD9WPvqJkA).

Fall 2023	Speaker	Topic
Sept. 12	Charles S. Peskin (NYU) Sponsored by CAMBAM	**Control of Cell Volume with Space-Charge Layers and Bulk Electroneutrality** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-charles-s-peskin-350449)
Sept. 19	Steven Prescott (University of Toronto) Co-Sponsored by CAMBAM & the Alan Edwards Center for Research on Pain	**Neural coding strategies and the importance of excitability** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-steven-prescott-350913)
Sept. 26	Elena Kuzmin (Concordia University) Sponsored by QLS	**Evolution of chromosome arm aberrations in breast cancer through genetic network rewiring** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-elena-kuzmin-350779)
Oct. 3	Carsen Stringer (Howard Hughes Medical Institute) Sponsored in CAMBAM	**Making sense of large-scale neural and behavioral data** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-carsen-stringer-350907)
Oct. 10	No Seminar (Reading Week)	**TBD**
Oct. 17	Anne-Ruxandra Carvunis (University of Pittsburgh) Sponsored by QLS	**Systems Approaches to Decipher the Molecular Mechanisms of Evolutionary Innovation** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-anne-ruxandra-carvunis-350906)
Oct. 24	Simon Levin (Princeton University) Sponsored by QLS	**Ecosystems and the Biosphere as Complex Adaptive Systems: *Scaling, collective phenomena and governance*** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-simon-levin-351439)
Oct. 31	Eric Pedersen (Concordia University) Sponsored by QLS	**How do we define a patch? Deriving subpopulation structure from movement models using random-walk-based distance metrics** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-eric-pedersen-350928)
Nov. 7	Tarik Gouhier (Northeastern University) Sponsored by QLS	**Quantitative Dissonance** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-tarik-gouhier-350523)

Fall 2023	Speaker	Topic
Nov. 14	Ariel Rokem (University of Washington) Sponsored by QLS	**Opportunities and challenges for studying human brain connections in the era of brain observatories** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-ariel-rokem-351052)
Nov. 21	Jonathan Rubin (University of Pittsburgh) Sponsored by CAMBAM	**Qualitative inverse problems: Mapping from limited data to properties of dynamics and parameter values for ODE models** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-jonathan-rubin-352196)
Nov. 28	Adrienne Fairhall (University of Washington) Sponsored by CAMBAM	**From neural nets to movement in Hydra** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-353023)
Dec. 5	Angela Yu (UCSD) Sponsored by CAMBAM	Computational Modeling of Human Face Processing (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-angela-yu-353170)

QLS would like to thank Dr. Jesse Shapiro, Dr. Suresh Krishna, and Dr. Celia Greenwood for their help with organizing the seminars.

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QLS Seminar Series Winter 2024

QLS has joined efforts with the Centre for Applied Mathematics in Bioscience and Medicine (CAMBAM), the McGill initiative in Computational Medicine (MiCM) and the Ludmer Center to offer weekly interdisciplinary seminars.

Seminars are held on Tuesdays from 12-1pm EST.

For video recordings of previous seminars please visit here: QLS YouTube Page (https://www.youtube.com/channel/UCShV4ohDhQDLfcD9WPvqJkA).

Winter 2024	Speaker	Topic
Jan. 9	Konrad Kording (UPenn) Sponsored by QLS	**Machine learning for causal inference** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-konrad-kording-353228)
Jan. 16	Andreas Buttenschoen (UMASS, Amherst) Sponsored by CAMBAM	**Cell Entrainment in a Mechano-Chemical Model of Collective Cell Migration** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-andreas-buttenschoen-353915)
Jan. 23	Stephanie Jones (Brown University) Sponsored by CAMBAM	**Interpreting the Mechanisms and Meaning of Human MEG/EEG signals with the Human Neocortical Neurosolver (HNN) Neural Modeling Software** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-stephanie-jones-353909)
Jan. 30	**QLS Research Day** Keynote Speaker: Josee Dupuis (McGill)	**Multi-Cohort Statistical Approaches with Applications to Type 2 Diabetes**
Feb. 6	Alex Diaz-Papkovich (Brown University) Sponsored by QLS	**Topological analysis of high-dimensional human genetic data in biobanks** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-alex-diaz-papkovich-354584)
Feb. 13	Christian Landry (Université Laval) Sponsored by QLS	**Navigating protein fitness landscapes in multiple dimensions** (https://www.mcgill.ca/qls/channels/event/qls-seminar-christian-landry-354494)
Feb. 20	Camille Maumet (INRIA) Sponsored by QLS	**Towards reproducible neuroimaging across different analysis pipelines** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-camille-maumet-355158)

Winter 2024	Speaker	Topic
Feb. 27	Stephanie Palmer (University of Chicago) Sponsored by CAMBAM	**How behavioral and evolutionary constraints sculpt early visual processing** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-354138)
Mar. 5	No Seminar (Reading Week)	No Seminar
Mar. 12	Alton Russell (McGill University) Sponsored by QLS	**Informing policies to mitigate iron deficiency in blood donors through public health data science** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-alton-russell-355642)
Mar. 19	Hanspeter Herzel (Institute for Theoretical Biology) Sponsored by CAMBAM	**Oscillator theory meets biological rhythms** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-hanspeter-herzel-355349)
Mar. 26	Sridevi Sarma (Johns Hopkins University) Sponsored by CAMBAM	**Network Biomarkers for Epilepsy Diagnosis and Treatment: combining brain imaging data with systems modeling** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-sridevi-sarma-355851)
Apr. 2	Erin Dickie (CAMH) Sponsored by QLS	**Transdiagnostic neuroimaging to understand mental health across the lifespan** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-erin-dickie-356060)
Apr.9	Guillaume Butler-Laporte (McGill University) Sponsored by QLS	**Can genomics really improve management of human diseases?** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-guillaume-butler-laporte-356516)
Apr. 16	Julia Rohrer (University of Leipzig) Sponsored by CAMBAM	**Directed Acyclic Graphs as a Tool to Reason about Causality** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-julia-rohrer-356226)

Winter 2024	Speaker	Topic
Apr. 23	Sirui Zhou (McGill University) Sponsored by QLS	**"Population Omics", complex traits and drug targets** (https://www.mcgill.ca/qls/channels/event/qls-seminar-series-sirui-zhou-356298)

Time	Activity
10:30 - 11:00 AM	Preparation and opening remarks
11:00 AM - 11:30 AM	**_Research Talk 1: Anticipating ecological regime shifts in response to climate change: The rate of change matters_** Fred Guichard (Department of Biology; McGill University)
11:30 AM - 12:00 PM	**_Research Talk 2: Fibrillatory conduction in a model of atrial microstructure with dynamic gap junctions_** Vincent Jacquemet (Département de pharmacologie et physiologie; Université de Montréal)
12:00 PM - 1:00 PM	Lunch
1:00 PM - 1:30 PM	**_Research Talk 3: Brain rhythm bursts as quasi-cycles and first return time event_** Andre Longtin (Department of Physics; University of Ottawa)
1:30 PM - 2:00 PM	**_Career Talk: From McGill to Labfront: A global journey in health tech and research innovation_** Jordan Masys (Labfront; Co-founder)
2:00 PM - 2:15 PM	Coffee break
2:15 PM - 3:00 PM	Session 1: CAMBAM trainee presentations (5 min each)
3:00 PM - 3:15 PM	Coffee break
3:15 PM - 4:00 PM	Session 2: CAMBAM trainee presentations (5 min each)
4:00 PM - 4:15 PM	Coffee break
4:15 PM - 5:00 PM	Session 3: CAMBAM trainee presentations (5 min each)
5:00 PM	Closing remarks and departure

Session 1 Speakers:

1. Thomas Bury (McGill University; Bub Lab)
   Title: Early warning signals for transitions in cardiac systems
2. Hassan Jamaleddine (McGill University; Khadra Lab)
   Title: How TCR repertoire diversity shapes pathogen evolution within hosts
3. Brendon McGuinness (McGill University; Guichard Lab)
   Title: Do species' traits matter? Consequences of trait plasticity on the structure of ecological communities
4. Raphaël Lafond-Mercier (University of Ottawa; Longtin Lab)
   Title: Keeping time with heterogeneous adaptation
5. Niklas Brake (McGill University; Khadra Lab)
   Title: Biophysical simulations of EEG generation elucidate the neurophysiological factors that shape broadband EEG spectra
6. Elham Zakeri Zafarghandi (UdeM; Jacquemet Lab)
   Title: Simulation of endoepicardial dissociation in an interconnected cable model of the left atrium
7. Jonas Lehnert (McGill University; Krishnaswamy/Cook/Khadra Labs)
   Title: Reverse correlation reveals visual attention to features and space in mice
8. François Bourassa (McGill University; Francois Lab)
   Title: Modelling cross-receptor interactions in CAR T cells for precision immunotherapy
9. Shayan Hajhashemi (UdeM; Craig Lab)
   Title: Gradient-based optimization of controlled event functions in virtual clinical trials of drug-combinations for treating glioblastoma

Session 2 Speakers:

1. Kamyar Tavakoli (University of Ottawa; Longtin Lab)
   Title: Simultaneous Signals Prediction Using Time Delay Reservoir Computing
2. Nils Koch (McGill University; Khadra Lab)
   Title: Spike frequency adaptation in Macaque Prefrontal Cortex
3. Yohaï-Eliel Berreby (McGill University; Krishna Lab)
   Title: Modeling visual localization: the role of receptive field remapping
4. Xiaotian Hua (McGill University; Guichard Lab)
   Title: Spatial and temporal coral-algae dynamics
5. Amin Akhshi (McGill University; Khadra Lab)
   Title: The neural basis of robust invariant coding in sensory systems
6. Zoe Zhuang (McGill University; Brown Lab)
   Title: Optimizing calcium image acquisition with machine learning denoising algorithms
7. Sonia Gazeau (UdeM; Craig Lab)
   Title: Modelling vaccination against CMV in high-seroprevalence countries

8. Maxime Daigle (McGill University; Bashivan Lab)
   Title: Reverse engineering non-stereotypical hippocampal neurons with goal-driven neural networks
9. Louis Richez (McGill University; Khadra Lab)
   Consequences of T cell receptor organization on the discriminability of multivalent ligands

Session 3 Speakers:

1. Xinyue Ma (McGill University; Sharif/Khadra Labs)
   Title: ElecFeX: A user-friendly toolkit for efficient feature extraction from single-cell electrophysiological recordings
2. Wendy Wang (McGill University; Humphries Lab)
   Title: Numerical methods for delay differential equations with threshold state-dependent delay
3. Solène Hegarty-Cremer (UdeM; Craig Lab)
   Title: Modelling retinol dynamics in influenza and their relationship with immune dysregulation in vitamin A deficiency
4. Shuaishuai Li (McGill University; Guichard Lab)
   Title: Cure or Curse? Simulation Indicates that Microbes Prosper under Disinfection Measures in the Space Station
5. Fatemeh Beigmohammadi (UdeM; Craig Lab)
   Title: Efficient methods for generating virtual populations with applications for infectious diseases
6. Fritz Jalandoni (McGill University; Krishnaswamy/Cook/Khadra Labs)
   Title: Optical Flow Mapping on Mouse Cortex Activity: A Window to Attentional Circuits
7. Mia Brunetti (UdeM; Craig Lab)
   Title: Mathematical modelling of clonal reduction therapeutic strategies in acute myeloid leukemia
8. Jake Harvey (McGill University; Guichard Lab)
   Title: Using hypergraphs to incorporate non-feeding interactions into foodwebs
9. Terry D. Easlick (UdeM; Craig Lab)
   Title: Virtual Clinical Trials of Candidate Shingles Vaccines

Appendix 3

CENTRE
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The CRM contributes to the emergence of a new Santé Numérique thematic network

CRM Distinguished Lectures in Applied Mathematics

APRIL 30 - MAY 1, 2024

DISTINGUISHED LECTURE SERIES

Overview   Organizers   Speakers   Venue   Contact   ⧉ Français

BACK

BACK TO CALENDAR

Overview

Building on the success of existing distinguished lectures series (the Aisenstadt Chairs and Nirenberg Lectures), the CRM is launching this new annual series of lectures in applied mathematics.

This year's lectures will be devoted to mathematical biology. The speakers are Ruth Baker of the Mathematical Institute at the University of Oxford and Alison Hill of the Institute for Computational Medicine and Infectious Disease Dynamics Group of Johns Hopkins University.

The speakers will each give two presentations, the first on April 30 and the second on May 1.

The lectures on April 30 are aimed at a broad mathematical audience, and will be followed by a reception. The lectures will take place in hybrid mode in room 6214 of the André-Aisenstadt Pavilion (Université de Montréal) and via Zoom. To obtain the Zoom link please subscribe to our Colloquia and Distinguished Lectures mailing list before April 17.

The lectures on May1, will be held on-site in room 6214 of the André-Aisenstadt pavilion.

Ruth E. Baker (University of Oxford)

Biography : Ruth Baker is Professor of Applied Mathematics at the Mathematical Institute, University of Oxford, where she leads a group focussed on developing and applying mathematical, computational and statistical methods to better understand key problems in cell and developmental biology. In 2014 she was awarded the Whitehead Prize of the London Mathematical Society for outstanding contributions to the field of mathematical biology, in 2019 she was elected Fellow of the Royal Society of Biology (FRSB), and in 2020 Fellow of the Institute of Mathematics and Its Applications (FIMA) .

Tuesday, April 30, 2024, 2 p.m. to 3 p.m. (room 6214 and Zoom)
Title: Integrating mechanistic models with computational statistics and machine learning to provide new insights

Abstract: With the advent of a host of new experimental technologies, the last ten years has seen an explosion in the amount and types of quantitative data now being generated in the fields of cell and developmental biology. Whilst these data have the potential to provide significant new insights into key processes, there are significant challenges in interrogating them using classical mechanistic mathematical models. In this talk I will outline some of those challenges and how we have begun to tackle them through the integration of tools from computational statistics and machine learning.

Wednesday, May 1, 2024, 10:30 à 11:30 (room 6214)
Title: What can identifiable models tell us about regulation of the cell cycle?

Abstract: The spatiotemporal coordination and regulation of cell proliferation is fundamental in many aspects of development and tissue maintenance. Cells can adapt their division rates in response to mechanical checkpoints, yet we do not fully understand how cell proliferation regulation impacts collective cell migration phenomena. I will present a suite of continuum models of collective cell

migration with cell cycle dynamics, which differ in their ability to describe mechanical constraints and hence cell proliferation regulation. By combining these mathematical models, Bayesian inference, and recent experimental data, I evaluate the level of model complexity that is consistent with the data and quantify the impact of mechanical constraints across different cell cycle stages in epithelial tissue expansion experiments. The modelling results predict that cells sense local density and adapt cell cycle progression in response, both during G1 and the combined S/G2/M phases, and provide an explicit relationship between each cell cycle stage duration and local tissue density.

Alison L. Hill (Johns Hopkins University)

Biography : Alison Hill is Assistant Professor of Biomedical Engineering at the Johns Hopkins University and a core faculty member at the Institute for Computational Medicine and in the Infectious Disease Dynamics Group. Her research team develops mathematical models and computational tools to help understand, predict, and treat infectious diseases, with a particular focus on HIV/AIDS, SARS-CoV-2/COVID-19, and drug resistant infections. Alison received her BS in Physics from Queen's University, her PhD in Biophysics and Medical Physics through the Harvard-MIT Division of Health Sciences & Technology, and her MPH from Harvard School of Public Health. She is a previous recipient of the NIH Director's Early Independence Award and the World Economic Forum's Young Scientist Award.

Tuesday, April 30, 2024, 3:30 p.m to 4:30 p.m.(room 6214 and Zoom)
Title: Model-based evaluation of HIV treatment strategies

Abstract: HIV/AIDS remains a major global health concern, with no vaccine or curative therapy. Current standard of care involves daily, lifelong adherence to combination antiretroviral drugs, which can be compromised by drug resistance. New therapies with diverse mechanisms of action are in the pipeline, but their potential costs and benefits must be carefully evaluated. In this talk I will discuss how mathematical models of HIV infection within individual patients can be used to understand disease dynamics and evaluate interventions. I will give examples where these models have provided critical guidance into the development and deployment of new therapeutics for HIV treatment, prevention, and cure.

Mercredi, 1er mai 2024, 13h30 à 14h30 (room 6214)
Title: Quantifying household transmission dynamics for epidemic control: COVID-19 and beyond

Abstract: Households are important but often overlooked settings for the spread of infectious diseases. In this talk I will discuss how mathematical models that incorporate household transmission networks can inform epidmic control, with examples from COVID-19. First, I will present work showing how household transmission impacts the effectiveness of large-scale social distancing for epidemic control, and how household composition mediates infection risk. Secondly, I will discuss how models can inform the intersection of housing policy and epidemic control, and in particular an evaluation of the CDC's 2020 eviction moratorium. Finally, I will present a new mathematical framework for using household outbreak dynamics to quantify inter-individual variation in infectiousness and susceptibility, which are critical determinants of population-level transmission patterns.

This series is supported by the Strategia FRQNT program ("Modeling of Emerging Challenges" project)

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119 - Mathematical modeling of immuno-oncology and neurology: translation of physiological and pharmacological mechanisms into therapeutic strategies

Thursday May 11, 2023

In the treatment of cancer, the combination of immunotherapy with more traditional therapeutic approaches, such as chemotherapy and radiotherapy, is increasingly adopted with successes never before observed. This has caused a rush to research new therapeutic targets (checkpoint inhibitors), thus multiplying clinical studies, the results of which are hampered by the unavailability of participants. …

Read more

Thanks

We thank supporting organizations and our industry partners:

- NSERC
- FRQNT
- Prompt Innov
- Syneos Health
- Pfizer
- Faculty of Pharmacy, University of Montreal

📍/🖥 On site and online

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👥 Managers

Fahima Nekka
UdeM - University of Montreal

Frederique Fenneteau
UdeM - University of Montreal

Partners

Thursday May 11, 2023

Bonjour, je suis un robot d'assistance en ligne. Notez que les agent·e·s sont disponibles pendant la semaine du congrès, de 7h à 17h (heure du Québec) pour répondre à vos questions.

Before noon

09:00 a.m. to12:00 p.m.

Oral communications

Immuno-oncology: too many clinical trials, not enough patients. Modeling as a solution?

⚲/▣ **On site and online**

Building : University of Montreal - Jean-Brillant   **Location** : B-3240
Chair/Moderator : Fahima Nekka *(UdeM - University of Montreal)*
Discussant : Hamza Charef *(UdeM - Université de Montréal)* , Frederique Fenneteau *(UdeM - Université de Montréal)* , Khalil Elmehdi Ismaili *(UdeM - Université de Montréal)* , Nathalie Letarte *(UdeM - Université de Montréal)* , Fahima Nekka *(UdeM - University of Montreal)* , Miriam Schirru *(UdeM - University of Montreal)* , Didier Zugaj *(SyneosHealth)*

Session summary

09:00

Welcoming participants

9:30 a.m.

Welcome word

9:35 a.m.

Quantitative challenges in immuno-oncology
Fahima Nekka *(UdeM - University of Montreal)*

9:45 a.m.

Use of immunotherapy in the treatment of cancer: history, clinical impacts and challenges
Nathalie Letarte *(UdeM - University of Montreal)*

Summary

10:10 a.m.

Chemotherapy, radiotherapy and immunotherapy, exploring potentially winning combinations to treat non-small cell lung cancer
Khalil Elmehdi Ismaili *(UdeM - University of Montreal)* , Miriam Schirru *(University of Montreal)* , Hamza Charef *(University of Montreal)* , Frederique Fenneteau *(University of Montreal)* , Didier Zugaj *(Syneos Health)* , Pierre-Olivier Tremblay *(Syneos Health)* , Fahima Nekka *(University of Montreal)*

Summary

10:35 a.m.

Implementation and evaluation of radiotherapy treatments in a virtual population of patients with non-small cell lung cancer.
Hamza Charef *(UdeM - University of Montreal)* , Miriam Schirru *(University of Montreal)* , Frederique Fenneteau *(University of Montreal)* , Khalil-Elmehdi Ismaili *(University of Montreal)* , Didier Zugaj *(Syneos Health)* , Fahima Nekka *(University of Montreal)* , Pierre-Olivier Tremblay *(Syneos Health)*

Summary

11:00

Break

11:15 a.m.

Evaluating the Effectiveness of Combined Radiotherapy and Anti-PD1 Treatment for Lung Cancer Patients Through Virtual Clinical Trials

Miriam Schirru *(UdeM - University of Montreal)* , Hamza Charef *(University of Montreal)* , Khalil-Elmehdi Ismaili *(University of Montréal)* , Frederique Fenneteau *(University of Montreal)* , Didier Zugaj *(Syneos Health)* , Pierre-Olivier Tremblay *(Syneos Health))* , Fahima Nekka *(University of Montreal)*

Summary

11:40 a.m.

Development of tools for the extraction of therapeutic information from the dynamic behavior of quantitative systems pharmacology models.Case of immuno-oncology

Didier Zugaj *(SyneosHealth)* , Frederique Fenneteau *(University of Montreal)* , Pierre-Olivier Tremblay *(Syneos Health)* , Fahima Nekka *(University of Montreal)*

Summary

Dinner

12:00 p.m. to1:30 p.m.

Dinner

Dinner and discussions

📍 **Only on site**

Building : University of Montreal - Jean-Brillant   **Location** : B-3240

Afternoon

1:30 p.m. to3:00 p.m.

Oral communications

Neurology

📍/🖥 **On site and online**

Building : University of Montreal - Jean-Brillant   **Location** : B-3240

Discussant : Janelle Drouin-Ouellet *(UdeM - University of Montreal)* , Fahima Nekka *(UdeM - University of Montreal)* , Philippe Robaey *(University of Ottawa)* , Miriam Schirru *(UdeM - University of Montreal)* , Florence Véronneau-Veilleux *(André-Grasset College)* , Didier Zugaj *(SyneosHealth)*

Session summary

1:30 p.m.

Quantitative challenges in neurology

Fahima Nekka *(UdeM - University of Montreal)*

1:45 p.m.

Computational modeling and cellular reprogramming for the development of therapeutic strategies for Parkinson's

Janelle Drouin-Ouellet *(UdeM - Université de Montréal)* , Adriaan Merlevede *(Lund University)* , Emilie Legault *(Université de Montréal)* , Julie Bouquety *(Université de Montréal)* , Florence Petit *(Université de Montréal)* , Shelby Shrigley *(Lund University)* , Marcella Birtele *(Lund University)* , Maria Pereira *(Lund University)* , Petter Storm *(Lund University)* , Yogita Sharma *(Lund University)* , Viktor Drugge *(Lund University)* , Johan Jakobsson *(Lund University)* , Roger Barker *(University of Cambridge)* , Victor Olariu *(Lund University)* , Malin Parmar *(Lund University)*

Summary

2:10 p.m.

Development of an integrative model to better understand the evolution of the effect of levodopa with the progression of Parkinson's disease

Florence Véronneau-Veilleux *(Collège André-Grasset)* , Philippe Robaey *(University of Ottawa)* , Mauro Ursino *(University of Bologna)* , Fahima Nekka *(University of Montreal)*

Summary

2:35 p.m.

A model of ADHD as resulting from a phasic/tonic dopamine imbalance during reinforcement learning

, Florence Véronneau-Veilleux *(University of Montreal)* , Mauro Ursino *(University of Bologna)* , Fahima Nekka *(University of Montreal)*

Summary

Development of an integrative model to better understand the evolution of the effect of levodopa with the progression of Parkinson's disease

Florence Véronneau-Veilleux *(Collège André-Grasset)* , Philippe Robaey *(University of Ottawa)* , Mauro Ursino *(University of Bologna)* , Fahima Nekka *(University of Montreal)*

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Anmar Khadra, Dr.

From:	Sara Ahmed, Prof.
Sent:	Thursday, February 15, 2024 5:24 PM
To:	Sara Ahmed, Prof.
Cc:	Philippe Després; Aude Motulsky; Bouchra Nasri; Martin Vallières
Subject:	Excellente nouvelle : Notre réseau de santé numérique (RSN) FRQS est financé !

English Follows

Chers membres et partenaires,

Nous sommes enchantés de vous annoncer que notre réseau de santé numérique a été financé ! Il s'agit d'une étape importante pour nous, et c'est grâce au travail acharné et au dévouement de toutes les personnes impliquées.

Nous sommes impatients de commencer et de profiter de cette occasion de propulser la recherche dans toutes les facettes de la santé numérique. Au cours des prochains mois, nous prendrons contact avec vous afin de planifier et d'organiser nos efforts ensemble.

Nous vous invitons à partager ce lien avec les membres de vos réseaux qui pourraient être intéressés à rejoindre le RSN: lien pour adhérer au réseau.

Merci pour votre soutien continu.

Pour en savoir plus sur l'annonce des réseaux financés, veuillez vous référer à la page suivante du FRQ: https://frq.gouv.qc.ca/le-frqs-soutient-15-reseaux-thematiques-de-recherche/

Sincères salutations,
L'équipe de direction du RSN
Sara Ahmed, Philippe Després, Aude Motulsky, Bouchra Nasri, Martin Vallières

***

Dear Members and Partners of the RSN,

We are excited to share that our Digital Health Network has been funded! This is a huge milestone for us, and it's all thanks to the hard work and dedication of everyone involved.

We're looking forward to getting started and making the most of this incredible opportunity. Over the next few months, we'll be reaching out to plan and organize our efforts together.

We invite you to share this link with members of your networks who might be interested in joining the RSN: link to join the network.

Thank you for your continued support.

For more information on the announcement of funded networks, please refer to the following FRQ page:
https://frq.gouv.qc.ca/le-frqs-soutient-15-reseaux-thematiques-de-recherche/

Sincerely,

The RSN leadership team

Sara Ahmed, Philippe Després, Aude Motulsky, Bouchra Nasri, Martin Vallières

Sara Ahmed, PT, PhD
_____
Professor, McGill University
Faculty of Medicine and Health Sciences
McGill University Health Center, Clinical Epidemiology

Research Scientist
Centre de recherche interdisciplinaire en réadaptation (CRIR)
Responsable de site, Constance Lethbridge Rehabilitation Center
du CIUSSS du Centre-Ouest-de-l'Île-de-Montréal

https://www.pchilab.ca
https://www.brilliant-cfi.ca

Anmar Khadra, Dr.

From:	Alexandre Girouard <alex.girouard@gmail.com>
Sent:	Tuesday, May 16, 2023 10:04 PM
To:	Marion Cesari; Anmar Khadra, Dr.
Cc:	proposals@crm.umontreal.ca; Octav Cornea
Subject:	Re: Proposal for a workshop - Rhythms, Networks and slow-fast analysis in neural and endocrine systems

Dear Anmar,

The management committee had the occasion to review your application today.

The workshop seems very nice and the CRM will support it. Let me say first that 2024 is already quite full and so we propose that the workshop be held during the summer of 2025. The financial details should be further discussed but let me already say that 30k is much more than what the CRM usually contributes for events of this duration and size. A more realistic amount is 15k. That said, we believe there are many other financial opportunities available, in particular for the funding of American and French participants. Given the topic of the workshop, there might also be some opportunities with FRQS.

We hope that this is encouraging news and that you'll pursue the preparation of this interesting workshop.

Best wishes,

Alexandre Girouard

--
Alexandre Girouard
https://archimede.mat.ulaval.ca/agirouard/

Directeur adjoint aux activités scientifiques
Centre de recherches mathématiques (CRM)
https://www.crmath.ca/

On 2023-05-15 10:43, Marion Cesari wrote:

> Dear Anmar,
>
> We have received your proposal. The management committee will review it as soon as possible.
>
> We should get back to you soon.
>
> Best regards,
>
> **Marion Cesari** | Technicienne en activités scientifiques
> marion.cesari@umontreal.ca

Centre de recherches mathématiques (CRM)
Pavillon André-Aisenstadt - Université de Montréal
crmath.ca

Twitter - YouTube - Facebook - LinkedIn - Instagram

De : Anmar Khadra, Dr. <anmar.khadra@mcgill.ca>
Date : vendredi, 12 mai 2023 à 16:59
À : proposals@crm.umontreal.ca <proposals@crm.umontreal.ca>
Cc : Claire Guerrier <claire.guerrier@univ-cotedazur.fr>
Objet : Proposal for a workshop - Rhythms, Networks and slow-fast analysis in neural and endocrine systems

Dear committee members,

We would like to submit the attached proposal to organize a workshop, entitled "Rhythms, Networks and slow-fast analysis in neural and endocrine systems". The proposal provides detailed description of the program, its theme, budget as well as a list of potential invitees. The aim is to organize the event sometime in the summer of 2024 or 2025.

We have also attached the CVs of the two organizers of this event.

We look forward to hearing from you soon.

Kind regards,
Anmar.

Anmar Khadra, Ph.D.
Associate Professor, Department of Physiology
Co-director, Centre for Applied Mathematics in Bioscience and Medicine (CAMBAM)
McGill University
McIntyre Medical Building, Room: 1120
Tel (Office): 514-398-1743
Tel (Lab): 514-398-3639
http://www.medicine.mcgill.ca/physio/khadralab/

Professeur titulaire

Département de mathématiques et de statistique
Université Laval
https://mat.ulaval.ca/

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📅 May 21-24, 2024

9th Annual Meeting of the Biophysical Society of Canada

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The 9th annual meeting of the Biophysical Society of Canada (BSC) will be held from May 21-24 2024, at the Université de Montréal, in Montreal (QC) Canada.

Biophysical techniques and discoveries have revolutionized research and technological developments, allowing for the advancement of materials research, biotechnologies, biosensing, medicine, and pharmaceutical research.

The annual meetings of The Biophysical Society of Canada provide a unique opportunity for students and researchers in academia and industry to learn about the most recent advances in biophysics through invited lectures and student talks/posters, as well as exhibits by companies.

Register for our annual meeting to learn more about biophysics in Canada and worldwide. From membrane biophysics and lipids to biological nanostructures to emerging biophysical and nanotechnology tools, each session boasts a great selection of keynote and invited speakers to provide attendees invaluable exposure to biophysical research and industry.

The meeting starts with an opening reception on the evening of May 21st. Presentations start on the morning of May 22 and end in the early afternoon on May 24. A trainee symposium will occur on May 21st between 2:00 and 5:00 pm.

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For additional information about BSC 2024 Meeting, please email: bsc2024@umontreal.ca.

BSC2024 Award Lectures

The 9th Annual BSC Meeting will host the 2024 National Lecture and the BSC Early Career Award presentation by:

BSC2024 National Lecturer: Paul Wiseman

Department of Physics and Department of Chemistry, McGill University

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BSC Early Career Awardee: Justin MacCallum

University of Calgary

BSC2024 Keynotes Speakers

These three invited keynote speakers will highlight the broad spectrum of 2024 BSC Annual Meeting.

Keynote Speaker: Ibrahim Cissé

Max Planck Institute for Immunobiology and Epigenetics

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Keynote Speaker: Dr. Andrea Liu

University of Pennsylvania

Keynote Speaker: Jan C. Behrends

University of Freiburg

Apply for a trainee travel award for BSC2024

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...........vel awards are available for students and post-doctoral fellows to attend the BSC annual

meeting. To apply, applicants must submit a short online application form and upload a recent CV.

To be eligible to apply, the trainee and their supervisor must be members of the Biophysical Society of Canada at the time of the application. Only one application per lab is permitted.

Application deadline: April 15th, 2024.

Organizing Committee

- Susanne Bechstedt (McGill University)

- Rikard Blunck (Université de Montréal)

- Nazzareno D'Avanzo (Université de Montréal)

- Paul François (Université de Montréal)

- Pascale Legault (Université de Montréal)

- Ré Mansbach (Concordia University)

- Rafael Najmanovich (Université de Montréal)

- Lucien Weiss (Polytechnique)

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Location

Université de Montréal, QC, Canada
1375, Avenue Thérèse-Lavoie-Roux
Montréal, QC
Canada, H2V 0B3

Registration period

January 17, 2024 - 23:20 until May 24,
2024 - 13:00

Submission period

January 22, 2024 - 08:00 until May 1,
2024 - 14:00

Contact us

If you have any questions, please contact
bsc2024@umontreal.ca.

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CAMBAM Board-Member Meeting

AGENDA + MINUTES

Monday, Dec 4, 2023 at 1:30 PM, virtual
https://mcgill.zoom.us/j/89952119765

Attendees: Anmar Khadra, Erik Cook, Fred Guichard, Paul Francois, Antony Humphries, Fahima Nekka and Niklas Brake

1. CAMBAM directorship and board membership

   CRM has required each of its labs to have some level of turnover in their directorship. Given that Fred Guichard has been a co-director of CAMBAM for over 10 years, he has decided to step down and allow others to replace him. Fred circulated an email inviting CAMBAM members to nominate candidates. Unfortunately, that did not result in any nomination. As a result, co-director Anmar Khadra nominated Paul Francois to replace Fred as a co-directorship. The entire board accepted his nomination and Paul will take over from Fred on June 1, 2024.

   Anmar has also nominated Suresh Krishna as a board member to replace Jacques Belair. The board also approved this nomination and Suresh will serve in the board starting Jan 1, 2024.

2. CAMBAM funding (CRM, McGill)

   The guaranteed funding that CAMBAM receives comes from the CRM and the Faculties of Science and Medicine at McGill (through CRM). The formula has been the same as in previous years. The current funding CAMBAM receives is ~$27,061 per year.

3. CAMBAM partnership (Digital Health Network)

   Several members of CAMBAM have participated actively and successfully in establishing the Digital Health Network that will be funded by the *Fonds de recherche du Québec* (FRQ). Several members of CAMBAM have been directly involved in establishing this network, including Anmar Khadra, Fred Guichard, Jacques Belair, Fahima Nekka and Morgan Craig. The network will receive $1M per year in funding from FRQ and will consist of 4 independent axes: (1) Real-world data science; (2) Modeling and numerical methods; (3) Synthesis of evidence and digital interventions; (4) Digital transformation. Axis 2 is essentially an expansion of CAMBAM into the network. CAMBAM member Morgan Craig will be co-leading this axis, while Anmar Khadra will be co-leading Axis 3.

4. CAMBAM current and future programs (summer schools, retreats, workshops)

We invited CAMBAM trainees to submit proposals to organize online workshops whose themes were consistent with the scientific mission of CAMBAM. The call for proposals that was circulated by CAMBAM offered the organizers $1,000 awards for full day workshops and $500 for half-day workshops. We received three excellent proposals that were all approved (see description of these workshops below). Two of these workshops were 1-day events that were held on June 16 and 28, while the third one was a 2-day event that was held on June 27 and 28. CAMBAM member Anmar Khadra took care of circulating the announcement and assisting the organizers with the setting up these workshops.

List of workshops:
a. Title: Exploring Single Neuron Excitability with Mathematical and Computational Models. Organizer(s): Niklas Brake and Nils Koch (McGill).
b. Title: Machine Learning Applications in Computational Neuroscience and Biology. Organizer(s): Amin Akhshi (McGill).
c. Title: From Genome to Phenome: A Comprehensive Workshop on Genome-Wide Scans and Cutting-Edge Post-GWAS Techniques (1). Organizer(s): Goodarz Koli Farhood, Sahel Jahangiri Esfahani (McGill).

In the summer of 2024, similar workshops will be held. We will also hold a CAMBAM retreat in the Winter 2024 term (likely in February). Two speakers will be invited to give talks, and trainees will have a chance to give 5 min presentations in the retreat. Food and drinks will be served.

We will also aim to organize a summer school in 2025. Paul Francois and other members (perhaps Tony Humphries can assist with this).

5. Seminar series (in partnership with QLS)

Suresh Krishna has been organizing this seminar series in partnership with the QLS program at McGill. Some of these talks are in person but most are virtual. The portion of CAMBAM talks will be increased in the future.

6. CAMBAM fellowship

CAMBAM has some funding to provide in 2024. Six competitive fellowships will be provided to trainees of CAMBAM members. Applications consisting of a reference letter, transcripts and application from will be assessed by two independent reviewers with no conflict of interest. The fellowships will be $10,000 each.

7. Others

a. CAMBAM membership has to be updated. Anmar Khadra will circulate an email to the entire CAMBAM email list asking previous members to renew their membership and encouraging others to become members by submitting a statement of interest, a CV and/or give a talk. The board will then evaluate these requests and decide if they get approved or not. Each member will be asked to provide the list of trainees in their labs to update the email list. Tony Humphries will generate three email lists: one for board members, one for members and one for everyone else.

b. Paul Francois suggested that the CAMBAM website should include an entry that posts internships and other opportunities. He also suggested that the website be updated regularly. The latter could be done after finalizing the list of members and trainees.
c. Fahima Nekka asked if workshops organized by CAMBAM members should be included in the CAMBAM program/website. The answer was affirmative and all board members were encouraged to provide this information to CAMBAM co-directors to include such events in the website, in email communications and in annual reviews.
d. Paul Francois suggested increasing the reach of CAMBAM beyond the Montreal area by connecting with other groups in Laval that have similar interests (e.g., Complex Systems group). He will take the initiative in reaching out and building this connection.

Anmar Khadra, Dr.

From:	Anmar Khadra, Dr.
Sent:	Monday, May 8, 2023 1:33 PM
To:	CAMBAM_SEMINARS@LISTS.MCGILL.CA
Cc:	Niklas Brake; 'Nils Koch'
Subject:	CAMBAM Workshop - Exploring Single Neuron Excitability with Mathematical and Computational Models

Dear members,

CAMBAM is organizing the following online workshop on **June 16, 2023**.

Title: Exploring Single Neuron Excitability with Mathematical and Computational Models

Organizers: Niklas Brake and Nils Koch.

Description: Understanding the principles of neuronal excitability is fundamental for comprehending how neurons communicate with each other and perform computations. Computational models of neuronal excitability provide powerful tools to investigate the mechanisms underlying the generation and propagation of electrical signals in neurons. The Izhikevich model is a versatile model for studying neuronal excitability, which has been used in numerous studies to model a wide range of firing phenotypes. This workshop aims to provide participants with an understanding of the principles of computational modeling of neuronal excitability by focusing on the Izhikevich model as a case study. Through a hands-on approach, the workshop will guide participants through fitting the Izhikevich model to the qualitative firing features of neurons obtained from openly accessible data from the Allen Institute.

Quantitative Methodology to be Covered:
1. General overview of neuronal excitability and the various models available (Hodgkin-Huxley, Izhikevich, integrate and fire, etc.)
2. Deeper explanation of the Izhikevich model and its specific applications in neuroscience.
3. An overview of the Allen Institute's openly accessible data on neuronal excitability.
4. An introduction to the principles of model fitting and validation. Description of numerical integration and model fitting.

List of Activities:
1. Lecture: An introductory lecture on the principles of neuronal excitability and overview of the various models of excitability with an emphasis on the Izhikevich model. Theoretical description of numerical integration and parameter fitting algorithms.
2. Computer Lab/Demonstration: Participants will have the opportunity to apply the principles learned in the lecture by fitting the Izhikevich model to the qualitative firing features of neurons obtained from the Allen Institute's openly accessible data using Python. We will design interactive Jupyter Notebooks that the participants can build on to explore the practical challenges of modelling.
3. Discussion: Interactive discussions where participants can ask questions and share their experiences in breakout rooms.

To register in this event, please fill out the online form: https://forms.office.com/r/3Hi9Q5G6qg. The deadline for registration is June 12, 2023.

Kind regards,
Anmar Khadra.

Anmar Khadra, Dr.

Dear members,

CAMBAM is organizing the following online workshop on **June 28, 2023**.

Title: Machine Learning Applications in Computational Neuroscience and Biology

Organizers: Amin Akhshi.

Description: The increasing availability of large neural datasets in recent years has necessitated the development of advanced data analysis methods. Machine learning (ML) models have shown great promise in this regard, providing powerful tools for understanding complex neural systems. This workshop aims to provide an introduction to machine learning techniques and their applications in computational neuroscience and biology. We will cover the basics of machine learning, including supervised and unsupervised learning, deep learning, and reinforcement learning, and explore their applications in neuroscience, such as neural decoding, brain-computer interfaces, and data-driven modeling.

Quantitative topics to be covered: During this workshop, we will focus on the following quantitative methodologies in the context of ML applications in neuroscience and biology.
1. Supervised Learning (Classification and Regression)
2. Unsupervised Learning (Clustering, Dimensionality Reduction)
3. Reinforcement Learning
4. Neural Networks (Deep Learning, Convolutional Neural Networks, Recurrent Neural Networks)

To register in this event, please fill out the online form: https://forms.office.com/r/d7Y3RYgZtJ. The deadline for registration is June 20, 2023.

Kind regards,
Anmar Khadra.

From:	Anmar Khadra, Dr.
Sent:	Monday, May 8, 2023 1:47 PM
To:	CAMBAM_SEMINARS@LISTS.MCGILL.CA
Cc:	'Sahel Jahangiri Esfahani'; Goodarz Koli Farhood
Subject:	CAMBAM workshop - From Genome to Phenome: A Comprehensive Workshop on Genome-Wide Scans and Cutting-Edge Post-GWAS Techniques

Dear members,

CAMBAM is organizing the following online two-day workshop on **June 27 and 28, 2023**.

Title: From Genome to Phenome: A Comprehensive Workshop on Genome-Wide Scans and Cutting-Edge Post-GWAS Techniques

Organizers: Sahel Jahangiri Esfahani and Goodarz Koli Farhood.

Description: This workshop will provide an introduction to Genome-Wide Association Studies (GWAS) and advanced post-GWAS analysis techniques for identifying genetic variants associated with complex diseases or traits. The workshop will begin with a brief overview of GWAS methodology, including study design, quality control, data management, and statistical analysis. Participants will then learn how to use a machine learning tool (Regenie) to perform GWAS analysis, which accounts for population stratification, relatedness, and case-control imbalance to address potential biases in the detection of genetic associations. The workshop will cover the use of the FUMA platform for Functional Mapping and Annotation of Genome-Wide Association Studies. This tool integrates GWAS summary statistics with functional genomic data from a range of resources to identify functional genomic annotations indexed by GWAS signals. It also prioritizes candidate genes for further functional validation. Next, the workshop will introduce the MAGMA gene-based analysis tool, which identifies genes that are enriched with genetic variants associated with a particular phenotype. MAGMA calculates gene-level p-values based on the association of a phenotype with genetic variants in and around each gene, accounting for gene size, LD structure, and SNP annotation.

Quantitative methodology to be covered:

1. *Regenie:* a software tool used for GWAS analysis that aims to improve the detection of true genetic associations by accounting for population stratification and relatedness. It fits linear mixed models in two steps through applying linear/logistic ridge regressions on different blocks of single nucleotide polymorphisms (SNPs), separately, includes a polygenic background correction and a principal component analysis to control for population structure. This approach has been shown to increase power and reduce false-positive rates in GWAS studies, particularly in samples with complex family structures or cryptic relatedness.
2. *FUMA (Functional Mapping and Annotation of Genome-Wide Association Studies):* An online platform that allows researchers to annotate, visualize, and interpret GWAS results. It integrates GWAS summary statistics with functional genomic data from a range of resources, including gene expression data, epigenetic marks, chromatin accessibility, and protein-protein interactions. FUMA can identify functional genomic annotations that are enriched with GWAS signals and prioritize candidate genes for further functional validation.
3. *MAGMA (Multi-marker Analysis of GenoMic Annotation):* A gene-based analysis tool that tests for enrichment of genetic variants in gene regions. It calculates gene-level P values based on the association of a phenotype with genetic variants in and around each gene, while accounting for gene size, LD structure, and SNP annotation. MAGMA enables identification of genes that are significantly associated with a phenotype, as well as biological pathways (Gene-set) and tissue-specific expressions (Gene-property) that are enriched with these genes.

List of activities:

The workshop will include lectures as well as hands-on tutorials; practice data and a pipeline will be provided. Participants will need to have access to a LINUX server and have the introduced installed the software described here. Installation instructions will be provided.

To register in this event, please fill out the online [form](). *The deadline for registration is June 20, 2023.*

Kind regards,
Anmar Khadra.

'Avancées dans la théorie des réseaux écologiques: vers une intégrations des relations entre communautés et écosystèmes'

Lundi 22 – Mercredi 24 Mai 2023

Institut d'Écologie et des Sciences de l'Environnement de Paris (iEES Paris)
Sorbonne Université, 4 place Jussieu
Salle 417, 4e étage, barre 44-45

Organisateurs : Jake Harvey, Brendon McGuinness, Frédéric Guichard
(Université McGill)

La théorie des réseaux appliquée à l'écologie permet la caractérisation des nombreuses interactions écologiques qui caractérisent la plupart des écosystèmes naturels. Les approches plus dynamiques, souvent contraintes à l'étude de motifs incluant un nombre restreint d'interactions, prédisent l'impact de ces interactions sur la stabilité des réseaux et permettent l'études d'interactions non trophiques qui échappent à une description classique des interactions écologiques. Plusieurs avancées, certaines récentes, ont démontré la possibilité d'intégrer approches dynamique et statistiques aux réseaux, avec l'intégration d'interactions non trophiques ('higher-order interactions') et de flux spatiaux. L'objectifs de cet atelier sera de repousser davantage cette frontière grâce à des outils tels que les hypergraphes permettant de caractériser la topologie et l'étude dynamique des écosystèmes en tenant compte de l'ensemble d'interactions interspécifiques et écosystémiques reconnues comme cruciales au maintien de la diversité et des fonctions écosystémiques, telles que les relation trophiques, mais aussi le recyclage, les espèces ingénieures, la plasticité et l'évolution des interactions, et les flux spatiaux (dispersion, flux de matière). Nous espérons profiter ce grand défi pour engager un dialogue entre spécialistes des approches statistique et dynamique à l'étude des réseaux, d'approfondir leur utilisation pour étudier la relation entre communautés et écosystèmes, et de faciliter leur application à des systèmes naturels.

Contactez Frédéric Guichard (frederic.guichard@mcgill.ca) pour toute information et pour confirmer votre participation.